

What is claimed is:

1. A customer communication service system, comprising:

- 5           a) a call processing network for enabling communications between a voice client and  
            an agent having a telephone network interface connected to a telephone network;  
            b) means for connecting voice client communications to the call processing network  
            via the telephone network;  
            c) means for connecting geographically distributed agent communications from  
10           multiple call center sites to the call processing network via the telephone network;  
            d) the call processing network for enabling communications between a web client  
            and an agent having a data network interface connected to a global data  
            communications network;  
            e) means for connecting web client communications to the call processing network  
15           via the global data communications network; and  
            f) means for connecting geographically distributed agent communications from  
            multiple call center sites to the call processing network via the global data  
            communications network.

- 20   2. The customer communication service system of claim 1, wherein the telephone network  
          interface of the call processing network comprises an Telephony Switching Apparatus  
          switch connected to the telephone network for receiving voice client communications and  
          telephony resource nodes connected to the telephone network for distributing voice client  
          communications to agents, the Telephony Switching Apparatus switch being connected to  
25           the telephony resource nodes.

3. The customer communications service system of claim 1, wherein the data network interface of the call processing network comprises a firewall connected to the global data communications network and workflow management computer servers connected to the firewall for managing workflow, receiving and distributing media events, and servicing client requests from the global data communications network.
4. The customer communication service system of claim 1, wherein the call processing network further comprises:
- a) a shared disk cluster for storing data connected to cluster servers, the cluster servers connected to a call processing network LAN;
  - b) telephony and real-time services server computers connected to the call processing network LAN for providing voice processing service control, maintaining application state, load sharing, redundancy and fault recovery;
  - c) the telephone network interface comprising an Telephony Switching Apparatus switch and telephony resource nodes, the Telephony Switching Apparatus switch connected to the telephone network, telephony resource nodes, and the call processing network LAN, the telephony resource nodes connected to the telephone network, the Telephony Switching Apparatus switch, and the call processing network LAN;
  - d) a firewall connected between the global data communication network and workflow management computer servers; and
  - e) the workflow management computer servers connected to the firewall and the call processing network LAN for managing workflow, receiving and distributing media events, and servicing client requests from the global data communications network.

5. The customer communication service system of claim 4, wherein the Telephony Switching Apparatus switch is connected to the telephone network by a plurality of sharable voice trunk lines.

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6. The customer communication service system of claim 4, wherein the telephony resource nodes are connected to the telephone network by a plurality of sharable voice trunk lines.

7. The customer communication service system of claim 4, wherein the Telephony Switching Apparatus switch is connected to the telephony resource nodes by a plurality of sharable voice trunk lines.

8. The customer communication service system of claim 4, wherein each telephony resource node is connected the telephone and real-time services server computers by a voice recognition unit link.

9. The customer communication service system of claim 4, wherein the telephony resource nodes are adapted to provide at least one function selected from the group consisting of playing recorded audio announcements to callers, collecting dual tone multi-frequency digit strings from callers, providing Voice/Internet Protocol to agents using a high bandwidth Internet connection, playing music to calls queued by an Telephony Switching Apparatus switch, collecting information from callers via speech recognition, providing callers with voice mail, and facsimile receipt and delivery.

10. The customer communication service system of claim 4, wherein the telephony and real-time services server computers provide at least one function selected from the group consisting of real-time voice processing, maintaining application state, redundancy, load sharing, and fault recovery.

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11. The customer communication service system of claim 4, wherein the workflow management computer servers are adapted to provide at least one function selected from the group consisting of provisioning system services, billing, accounting, web services, maintaining databases, and transferring client data to agents via the global data communications network.

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12. The customer communication service system of claim 1, further comprising a customer site comprising:

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- a) an Telephony Switching Apparatus switch connected to the telephone network for connecting to the telephone network interface of the call processing network;
- b) means for connecting agent communications to the telephone network; and
- c) means for connecting agent communications to the global data communications network.

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13. The customer communication service system of claim 12, wherein the Telephony Switching Apparatus switch is connected to the telephone network by a plurality of sharable voice trunk lines.

14. The customer communication service system of claim 1, wherein the means for connecting voice client communications to the telephone network is selected from the group consisting of facsimile transmission means and voice transmission means.

5 15. The customer communication service system of claim 1, wherein the means for connecting web client communications to the global data communications network is selected from the group consisting of email message transmission means, chat message transmission means, facsimile transmission means, digital video transmission means, and digital voice transmission means.

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16. The customer communication service system of claim 1, wherein the global data communications network comprises the Internet.

17. A method for providing customer communication service, comprising:

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a) connecting a telephone network interface of a call processing network to a telephone network for enabling communications between voice client and an agent;

b) connecting voice client communications to the call processing network via the telephone network;

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c) connecting geographically distributed agent communications from multiple call center sites to the call center processing network via the telephone network;

d) connecting a data network interface of the call processing network to a global data communications network for enabling communications between a web client and an agent;

- e) connecting web client communications to the call processing network via the global data communications network; and
- f) connecting geographically distributed agent communications from multiple call center sites to the call processing network via the global data communications network.

18. The method for providing customer communication service of claim 17, wherein connecting a data network interface of the call processing network to a global data communications network comprises:

- a) connecting a firewall between the global data communication network and workflow management computer servers;
- b) connecting the workflow management computer servers to a call processing network LAN;
- c) connecting a shared disk cluster to cluster servers, the cluster servers connected to the call processing network LAN;
- d) connecting telephony and real-time services server computers to the call processing network LAN; and
- e) connecting the telephone network interface comprising an Telephony Switching Apparatus switch and telephony resource nodes between the call processing network LAN and the telephone network.

19. The method for providing customer communication service of claim 18, wherein the workflow management computer servers perform the following media event workflow steps:

- a) accepting media event input;

- 5 b) identifying media attributes through discovery events;
- c) identifying media attribute modifiers;
- d) associating values with media attributes and media attribute modifiers;
- e) universal queuing of media events, media attributes, media attribute modifiers and associated values;
- f) identifying available agents, agent attributes, agent attribute modifiers and associated values;
- g) performing skill-based matching of media event with available agents;
- h) selecting best agent media slot for media event; and
- 10 i) completing media event.

20. The method for providing customer communication service of claim 19, further comprising the step of predicting agent availability.

- 15 21. The method for providing customer communication service of claim 19, wherein accepting the media event comprises a chat request from client to a customer.

22. The method for providing customer communication service of claim 21, wherein the chat request processing comprises:

- 20 a) sending the client chat request to a workflow engine;
- b) forwarding the client chat request to an available agent having skills matching the chat request; and
- c) enabling chat between the client and the customer.

23. The method for providing customer communication service of claim 19, wherein accepting the media event comprises a fax request from client.

24. The method for providing customer communication service of claim 23, wherein the fax request process comprises:

- a) sending the client fax request to a workflow engine;
- b) forwarding the client fax request to an available agent having skills matching the fax request; and
- c) processing the fax request by the agent.

25. The method for providing customer communication service of claim 19, wherein the media event comprises an email from client.

26. The method for providing customer communication service of claim 25, wherein the email process comprises:

- a) sending the email to a workflow engine;
- b) forwarding the email to an available agent having skills matching the email request; and
- c) processing the email by the agent.

27. The method for providing customer communication service of claim 19, wherein the media event comprises a video request from client.

28. The method for providing customer communication service of claim 27, wherein the video request process comprises:

- a) sending the client video request to a workflow engine;



- b) forwarding the client video request to an available agent having skills matching the video request;
- c) enabling one-on-one video dialog between the client and the agent; and
- d) processing the video request by the agent.

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29. The method for providing customer communication service of claim 19, wherein the media event comprises a telephone call request from client.

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30. The method for providing customer communication service of claim 29, wherein the telephone call request from client process comprises:

- a) sending the telephone call request to a workflow engine;
- b) forwarding the client telephone call request to an available agent having skills matching the call request;
- c) enabling one-on-one voice dialog between the client and the agent; and
- d) processing the telephone call by the agent.

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31. The method for providing customer communication service of claim 29, wherein the telephone call request process comprises:

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- a) sending the telephone call request to a workflow engine;
- b) an agent having skills matching the call request is unavailable;
- c) forwarding by the workflow engine the telephone call request to a voicemail

system;

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- d) analyzing by the workflow engine pending voicemail in the voicemail system and when an agent having skills matching the voicemail is available, forwarding the voicemail to the available agent; and

e) processing the voicemail by the agent.

32. The method for providing customer communication service of claim 17, wherein the step of connecting geographically distributed agent communications from multiple call center sites to the call center processing network via the telephone network comprises dynamically allocating a plurality of sharable voice trunk lines between the multiple call centers and the telephone network to agents.

33. The method for providing customer communication service of claim 32, wherein

10 dynamically allocating a plurality of sharable trunk lines comprises:

- a) determining the number of agents A available to process media events for a customer;
- b) determining the trunk/agent ratio R;
- c) determining the required number of after hour trunks T;
- 15 d) calculating the ratio  $A \times R$ ;
- e) calculating the ratio  $A + T$
- f) determining the greater of  $A \times R$  and  $A + T$ ;
- g) using the greater of  $A \times R$  and  $A + T$  to determine a permitted number of trunks available for the customer;
- 20 h) accepting a call and pass to call treatment if the call does not exceed the permitted number of simultaneous calls; and
- i) rejecting the call if the number of calls exceeds the permitted number of simultaneous calls.

34. The method for providing customer communication service of claim 33, further comprising:

- a) evaluating whether calls outstanding for all customers exceed total permitted number of trunks available;
- 5 b) processing calls if calls outstanding do not exceed total permitted number of trunks available; and
- c) blocking calls if there are insufficient trunks available and another customer is likely to receive a call.

10 35. The method for providing customer communication service of claim 33, further comprising:

- a) evaluating progress of current calls already in progress for a particular customer;
- b) determining the likelihood of current calls terminating within a predetermined period of time;
- 15 c) rejecting additional calls if current call termination is not likely; and
- d) accepting additional calls if current call termination is likely.

36. Computer readable media tangibly embodying a program of instructions executable by a computer to perform a method for providing workflow management of a customer  
20 communication service, the workflow method comprising:

- a) accepting media event input;
- b) identifying media attributes through discovery events;
- c) identifying media attribute modifiers;
- d) associating values with media attributes and media attribute modifiers;

- e) universal queuing of media events, media attributes, media attribute modifiers and associated values;
- f) identifying available agents, agent attributes, agent attribute modifiers and associated values;
- 5 g) performing skill-based matching of media event with available agents;
- h) selecting best agent media slot for media event; and
- i) completing media event.

37. Computer readable media tangibly embodying a program of instructions executable by a

10 computer to perform a method for dynamic allocation of sharable trunk lines for a customer communication service, the allocation method comprising:

- a) determining the number of agents A available to process media events for a customer;
- b) determining the trunk/agent ratio R;
- 15 c) determining the required number of after hour trunks T;
- d) calculating the ratio  $A \times R$ ;
- e) calculating the ratio  $A + T$
- f) determining the greater of  $A \times R$  and  $A + T$ ;
- g) using the greater of  $A \times R$  and  $A + T$  to determine a permitted number of trunks
- 20 available for the customer;
- h) accepting a call and pass to call treatment if the call does not exceed the permitted number of simultaneous calls; and
- i) rejecting the call if the number of calls exceeds the permitted number of simultaneous calls.

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